NON-PUBLIC?: N
ACCESSION #: 8804200007

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Grand Gulf Nuclear Station - Unit 1 PAGE: 1 of 3

DOCKET NUMBER: 05000416

TITLE: Reactor Scram on Low Water Level
EVENT DATE: 03/15/88 LER #: 88-010-00 REPORT DATE: 04/13/88

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
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SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On March 15, 1988 a surveillance test on the reactor water level instrumentation was being run. A part of this surveillance test inserted a planned half scram signal of Reactor Protection System (RPS) "B" logic. At this time 29 control rods were fully inserted into the reactor core.

The insertion of
the 29 rods caused a rapid power decrease and a corresponding
reduction in the steam void generation rate. The reduction of steam volume caused the reactor water level to decrease to the scram trip setpoint of +11.4 inches which initiated a full reactor scram at 0950. All plant systems responded to the event as designed. The minimum reactor water level reached during the event was -2 inches which is 164.7 inches above the top of active fuel. No Emergency Core Cooling Systems actuated or injected during the event.

As a result of the investigation of this event it was discovered that a loose connection in an RPS terminal box had deenergized the "A" scram pilot solenoids of the 29 control rods. This placed the rods in a half scram condition. This condition was not detectable since no alarm or abnormal status was indicated. The surveillance test initiated RPS "B" logic trip in conjunction with the deenergized "A" solenoids which produced a full scram for the 29 rods.

The connection in the terminal box was cleaned and tightened. Similar connections were inspected and no other loose connections were found.

J16AECM88041102-3

(End of Abstract)

A. REPORTABLE OCCURRENCE

On March 15, 1988 at 0950 hours, the plant tripped on low reactor water level. This event is reported pursuant to 10CFR50.73(a)(2)(iv).

B. INITIAL CONDITION

The plant was in Opertional Condition 1 at 100 percent of rated thermal power. Reactor water level was normal at approximately 37 inches. The monthly channel functional test for high/low reactor water level instruments was in progress.

C. DESCRIPTION OF OCCURRENCE

The 193 control rods are divided into 4 scram groups which are dispersed radially in the core. Each rod has two scram pilot solenoids, one "A" and one "B", which are powered from Reactor Protection System (RPS) "A" and "B" logic, respectively. Both solenoids must deenergize to scram the rod. Scram group 3 contains 47 rods with 23 "A" solenoids wired in terminal box TB1CY01 (EIIS system code GG-1JC-JBX-TB1CY01) and 24 "A" solenoids wired in terminal box TB1CY02.

On March 15, 1988 the channel functional test for the RPS (EIIS System Code JC) high/low reactor water level instrumentation was in progress. This test first verifies the RPS "A" logic is not tripped, then trips the RPS "B" logic which should result in a half-scram. However, an undetectable failure had occurred in the RPS "A" circuitry for group 3 control rods downstream of the RPS trip logic.

A loose jumper bar connection in terminal box TB1CY01 resulted in deenergizing 5 "A" scram pilot solenoids and the feed to terminal box TB1CY02 which provides powerto 24 "A" scram pilot solenoids. The deenergized solenoids placed 29 group 3 control rods in a half scram condition. Therefore, when the RPS "B" half scram signal was initiated as part of the surveillance, the 29 control rods received a full scram signal and fully inserted into the core.

The insertion produced a rapid power decrease which suddenly reduced the steam void generation rate in the core. The reduction of steam volume caused the reactor water level to decrease to Level 3 (+11.4 inches) which produced a full reactor scram signal for all control rods. The full reactor scram occurredat 0950 on March 15, 1988.

The minimum reactor water level reached during the event was -2 inches which is 164.7 inches above the top of active fuel. No Emergency Core Cooling Systems (ECCS) actuated or injected to the core during the event. Water level was immediately recovered to normal using the feedwater system.

D. APPARENT CAUSE

A jumper bar connection in terminal box TB1CY01 was found to be loose. A records search of work activities on these terminal boxes revealed no work had been done that could have caused this condition on any of these connections since January, 1982.

The scram pilot solenoids are connected by jumper bars which are screwed in place. This screw was not sufficiently tightened resulting in a high resistance electrical connection which eventually created an open circuit to the scram pilot solenoids supplied through this connection.

The circuit design monitors the power supply to the terminal boxes but does not monitor the status of each individual scram pilot solenoid. Therefore, the operators and technicians were unaware of the failure prior to the scram.

E. SUPPLEMENTAL CORRECTIVE ACTION

The loose terminal connection was cleaned and tightened. There was no indication of corrosion on the connection. Other connections in the eight (8) similar terminal boxes were also verified tight. No other loose connections were found.

SERI is evaluating a design change to improve the reliability and power feeds of the system. The safety function of the control rod drive system will be considered in the final evaluation of the design change.

F. SAFETY ASSESSMENT

A review of plant data found no similar occurrences with these terminal box connections.

On March 9, 1988 the Average Power Range Monitors functional test was performed which causes half-scrams in each RPS logic. Since this test tripped the RPS "B" logic without producing a full scram on any control rod, the open connection occurred between March 9 and March 15, 1988.

The failure of the jumper bar connections did not prevent the control rod drive system from performing its safety function but did result in an unnecessary challenge to plant safety systems. All plant systems responded as designed to the event. At no time was the health or safety of the public affected.

J16AECM88041102-5

ATTACHMENT # 1 TO ANO # 8804200007 PAGE: 1 of 1

SYSTEM ENERGY
RESOURCES,INC.
OLIVER D. KINGSLEY, JR
VICE PRESIDENT
NUCLEAR OPERATIONS

U. S. Nuclear Regulatory Commission April 13, 1988
Washington, D. C. 20555

Attention: Document Control Desk

Gentlemen:
SUBJECT: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Reactor Scram on Low Water Level
LER 88-010-00
AECM-88/0079

Attached is Licensee Event Report (LER) 88-010-00 which is a final report.

Yours truly,

/s/ O. D. Kingsley, Jr.
ODK:bms

Attachment

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